

## STATEMENT OF CONSIDERATIONS

REQUEST BY AIR PRODUCTS AND CHEMICALS, INC. FOR AN ADVANCE WAIVER OF FOREIGN AND DOMESTIC RIGHTS IN SUBJECT INVENTIONS UNDER DOE CONTRACT NO. DE-AC26-98FT40419; WAIVER NO. W(A) 98-018, CH0985

Petitioner Air Products and Chemicals, Inc. (Air Products) has requested an advance waiver of foreign and domestic rights in all subject inventions arising under the referenced contract, entitled, "Carbon Dioxide Capture from Industrial Process Gases by High-Temperature Pressure Swing Adsorption (PSA)". The source of U.S. Government funding for the contract is the Office of Fossil Energy of the U.S. Department of Energy (DOE).

The scope of work under the contract involves developing a new low-cost adsorption technology to capture carbon dioxide (CO<sub>2</sub>) from flue gases and wet process gases by utilizing a unique class of adsorbent materials, and demonstrating and quantifying the benefits of applying the developed technology to identified industrial processes by conducting a semi-commercial field-test. The contract has an approximately five (5) year term, from 9/18/98 to 8/18/03, and the total amount of \$4,224,274.00 awarded under the contract is shared between DOE, contributing 56% or \$2,377,099, and Air Products, contributing 44% or \$1,847,175.

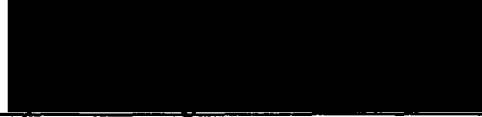
Current technologies used to remove carbon dioxide from process gases, such as polymeric membranes and chemical sorbents, are limited in their effectiveness to remove CO<sub>2</sub> under desired process conditions, e.g., feed gas pressure, temperature, presence of water. Air Products proposes to develop an adsorption technology based on a class of adsorbent materials called hydrotalcites. Under the contract, Air Products will chemically modify hydrotalcite materials for use at critical temperatures, pressures, and gas compositions, and integrate the adsorbents into existing industrial applications to demonstrate their economic and environmental benefits. The proposed work includes both laboratory research and pilot development, warranting a fully-developed technology available for commercialization.

Air Products is a world leader in gas separation technology, and its participation in the development of effective CO<sub>2</sub> adsorbents for use in gas clean-up systems will expedite attainment of Office of Fossil Energy program goals. One objective of the DOE Office of Fossil Energy's Vision 21 program is to provide a fleet of advanced, highly efficient, non-polluting energy plants/products that achieve net zero CO<sub>2</sub> emissions. Air Products' extensive experience in the design and optimization of adsorbent materials will help to meet this objective by ensuring timely development of an effective new technology for CO<sub>2</sub> removal from process gases and a resulting decrease in CO<sub>2</sub> emissions.

Air Products' commercial position also expedites utilization of the new technology developed and tested under the contract. Air Products owns and operates gas separation technology, and has successfully transferred its products and processes to various industries, including chemical processing, metallurgy, electronics, and pulp and paper industries. Air Products continues to maintain a strong presence within these market sectors. Granting the requested advance waiver will assist Air Products in its efforts to commercialize the developed technology and provide Air Products with an increased incentive to ensure successful commercialization.

Based on the foregoing Statement of Considerations and the representations in the waiver request, it is determined that the interests of the United States and the general public will best be served by a waiver of the patent rights of the scope described above and therefore the waiver is granted.

Concurrence:



George Rudins  
Deputy Assistant Secretary  
Office of Coal and Power Systems

DATE: 4/4/00

Approval:



Paul A. Gottlieb  
Assistant General Counsel for Technology  
Transfer and Intellectual Property

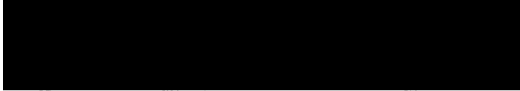
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Air Products has made substantial investments in gas separation technology and has developed many new products and processes at its private expense, as evidenced by its significant patent portfolio in this field (e.g., over sixty-three patents for adsorbent materials and adsorbent process cycles and applications). In fiscal year 1998, Air Products spent approximately \$34 million to develop expertise in adsorbent materials synthesis and characterization, and process cycle development. Air Products has extensive laboratory facilities dedicated to the development of novel adsorbent materials and methods, and Air Products has invested resources to evaluate new adsorption cycles through process modeling. Air Products owns and operates the largest PSA system and employs some of the world's leaders of research and development in this field.


Granting the requested advance waiver will not adversely effect competition and market concentration in the field of CO<sub>2</sub> removal technologies, as other U.S. and foreign industrial gas companies are actively developing similar technologies. The commercialization of the new technology developed under the contract by Air Products will help to ensure fossil energy remains a competitive and attractive energy source in an industry experiencing rapid change through deregulation and an increase in diversity and complexity.

Air Products has agreed to the standard terms and conditions applicable to advanced waivers, including march-in rights, U.S. industry preference provisions of 35 U.S.C. § 202, 203, and 204, and the U.S. Competitiveness clause attached hereto.

Upon evaluation of the Waiver Petition, and in view of the objective and considerations set forth in 10 CFR 784, all of which have been considered, it is recommended that the requested waiver be granted.

  
Mark P. Dvorscak  
Assistant Chief Counsel  
Office of Intellectual Property

DATE: June 1, 1999

  
Lisa M. Soltis  
Patent Attorney  
Office of Intellectual Property

DATE: May 27, 1999

### **U.S. Competitiveness Clause**

The Contractor agrees that any products embodying any waived invention or produced through the use of any waived invention will be manufactured substantially in the United States unless the Contractor can show to the satisfaction of the DOE that it is not commercially feasible to do so. In the event the DOE agrees to foreign manufacture, there will be a requirement that the Government's support of the technology be recognized in some appropriate manner, e.g., recoupment of the Government's investment, etc. The Contractor agrees that it will not license, assign or otherwise transfer any waived invention to any entity unless that entity agrees to these same requirements. Should the Contractor or other such entity receiving rights in the invention undergo a change in ownership amounting to a controlling interest, then the waiver, assignment, license, or other transfer of rights in the waived invention is suspended until approved in writing by the DOE.